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PREVENTION OF DIABETES MELLITUS COMPLICATIONS AMONG ADULTS



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PREVENTION OF DIABETES MELLITUS COMPLICATIONS AMONG ADULTS

Diabetes mellitus and its complications have proven to be parts of the major public health problems in Finland and it has called for the need to carry out research works on how to minimize these problems. The main purpose of this thesis is to produce information about prevention of diabetes mellitus complications among adults and the aim is to produce a guide for the public use in Terveystietä pages. Systematic literature review was used to analyse the data.

In this research, thirty recent journals were reviewed and five books were included. Academic databases such as Ebsco, Sciencedirect, OVID and Cinahi were used as sources of data. The study was based on the adults but the beneficiaries of the result could be any class. In the end, it was realized that efforts should be continuously made, in preventing the complications, rather than focusing on the treatment of the complications. Health information about how to prevent diabetes mellitus complication is given and the guide is developed separately. Possible researchable topics in the field of diabetes mellitus are also suggested as research areas for the future health students.

KEYWORDS: Diabetes mellitus, Complications, Epidemiology, Causes and risk factors, prevention, Coping strategies, Self management, Health education.

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LIST OF ABBREVIATIONS

T2D	Type 2 Diabetes
T1D	Type 1 Diabetes
DM1	Diabetes Mellitus 1
DM2	Diabetes Meliitus 2
GDM	Gestational Diabetes Mellitus
CVD	Cardiovascular Disease
CHD	Coronary Heart Disease
ESRD	End Stage Renal Disease
LDL	Low Density Lipo-protein
RRT	Renal Replacement Therapy
DCCT	Diabetes Control and Complication Trial
CDCP	Centers for Disease Control and Prevention
HIV	Human Immuno-deficiency Virus
AIDS	Acquired Immune Deficiency Syndrome
DAWN	The Diabetes Attitude, Wishes and Needs
DARTS	Diabetes, Audit and Research in Tayside, Scotland
NHANES	National Health and Nutritional Examination Survey
NHS	National Health Service

1 INTRODUCTION

The rate of diabetes patients with complications is increasing on a daily basis, admission is made either due to diabetes or diabetes complications such as stroke, hypertension, amputation, nephropathy, neuropathy, retinopathy, cardiovascular, impotence, skin lesions. A survey of trends in the leading causes of death in the USA between 1970 and 2002 found that the largest percentage reductions in age-adjusted death rates were for stroke (63%) and heart disease (52%). (Chaturvedi 2007, 6.) The increasing number of individuals with type 2 diabetes indicates a global epidemic. Prevalence of the disease was estimated to be 2.8% in 2000 and is predicted to increase to 4.4% by the year 2030. Although the prevalence of diabetes is expected to increase in all age groups, it has been estimated that there will be a greater increase in the proportion of patients with diabetes who are aged 45–64 years (Adiseshiah 2005, 23.) A previous study showed that patients with diabetes with inadequate health literacy and hypertension have poorer disease knowledge than those with adequate health literacy (Tang et al. 2007, 75).

This alarming situation became a challenge as a future nurse and a decision was made to research into the preventing diabetes complications and also develop a guide, not only to educate but also to empower the diabetes and non-diabetes people on how to live a diabetes-free life or cope with the diabetes if already affected. In a real sense, goals of diabetes education are majorly to optimize metabolic control, prevent acute and chronic complications, and also optimize quality of life while the costs attached is minimized to the bearest minimum (Debono & Cachia 2007, 547).

In this regard, the purpose of this thesis is to produce information about prevention of diabetes complications and the aim is to produce a guide for the public use in Terveysnetti.

However, Nurses have an important parts to play in this process, giving education to patients about the importance of change in lifestyle and medication concordance in type 2 diabetes. In referrence to diabetes educators, community resources and patient support groups help to enhance practice-based interventions by making sure that patients are empowered with the necessary information and support to make informed decisions about their everyday lifestyle. (Adiseshiah 2005, 25.)

2 BACKGROUND

Despite the efforts to control the growing number of diabetes patients, yet, the number of adults with diabetes worldwide is predicted to almost double over the next 25 years, from approximately 171 million in 2000 to 366 million by 2030 (Chaturvedi 2007, 5). Diabetes mellitus is now getting close to what could be referred to as epidemic proportions. In the United States, diabetes prevalence and incidence is on the increase in the past 2 decades. According to data from the NHIS for the period from 1980 to 2005, the age-adjusted prevalence of diabetes that were diagnosed was little bit stable at about 3.0% from 1980 to 1990, it started to rise. In 1990, the age-adjusted prevalence rate was 2.9%." It moved up to 4.5% in 2000 and to 5.3% in 2005. Therefore, the overall prevalence of diagnosed diabetes rises with age and the rate of increase over the period has been noted to be the largest among the people over 65 years of age. (Deshpande 2008, 1256.)

It is observed that human and economic costs of diabetes and its complications are abnormally high. In every 10 seconds, diabetes causes one death and one amputation every 30 seconds. It is also associated with adult-onset blindness as the major cause, as well as cardiovascular disease (CVD), and renal failure. Nonetheless, diabetes can be kept under control through small investments, and can be wholly prevented through interventions that are simple and cost-effective. Current International Diabetes Federation data suggest that by 2025, 380 million people are expected to have diabetes, while most of them will experience lifestyle-related type 2 disease. (Lefebvre & Silink 2006, 1625.)

Another concern is the increase in prevalence of obesity among children and adolescents. For example, collected data for the National Health and Nutritional Examination Survey shows that 17% of children and adolescents aged 2–19 years in the USA were overweight in 2003–2004, and that the prevalence of obesity had increased since 1999–2000 from 13.8 to 16.0% in girls and from 14.0 to 18.2% in boys (Chaturvedi 2007, 5).

Diabetes mellitus is a metabolic disease which, when not properly treated or untreated is characterized by chronic hyperglycaemia and disordered carbohydrate, lipid and protein metabolism and is associated with the development of specific microvascular complications and of non-specific macrovascular disease (Aalto 1999, 2). From the insulin angle of reasoning, diabetes mellitus is described as a group of chronic metabolic conditions, all of which are characterized by elevated blood glucose levels which is resulted from the inability of the body to produce insulin or resistance to insulin action, or both (Deshpande 2008, 1255).

It has been described as a killer disease in so many situations. Diabetes is now ranked among one of the most common non-communicable diseases in the world. It falls within 4th–5th leading cause of death in most developed countries and there are facts and figures that it is epidemic in many developing and newly industrialized countries. Diabetes is a progressive condition initially characterized by insulin resistance, where muscle and adipose tissue become relatively insensitive to the effects of insulin. As the condition progresses, declining beta cell activity results in relative insulin deficiency and blood glucose levels rise above normal levels. (Hill 2009, 50.) Meanwhile, the global burden of diabetes was 110 million in mid 90's and it is projected to increase to 221 million by the year 2010 (Park 2004, 33).

2.1 TYPES OF DIABETES

Type 1 diabetes occur as a results of auto-immune beta-cell destruction in the pancreas, characterized by a total absence of insulin production. Type 1 diabetes is reesponsible for 5% to 10% of all cases of diabetes. Associated risk factors include autoimmune, genetic, and environmental factors. Untill the present time, known solutions to prevent diabetes have not been discovered (Deshpande 2008, 1255).

In type 1 diabetes, also referred to as insulin-dependent diabetes mellitus (IDDM) or as juvenile onset is relatively early in life, in childhood or adolescence and usually before the age of thirty. This type of diabetes is a relatively homogeneous disease in which the insulin secretion of beta cells in the pancreas declines and eventually ceases totally. (Aalto 1999, 2.)

Type 2 diabetes can be linked to be accounting for around 90 per cent of all cases, it is a chronic metabolic disorder, in which the body is unable utilize glucose from food because of the inability of the pancreas to produce insulin or produces insufficient insulin, or the insulin itself is inactive (Naemiratch & Manderson 2007, 83). Type 2 develops when there is an unexpected increased resistance against the action of insulin and the body cannot produce proportionate insulin to counter the resistance. The incidence of Type 2 diabetes in children and adolescents is noted to be on a dramatic increase. It accounts for 90% to 95% of all diagnosed cases of diabetes. (Deshpande 2008, 1255.) Many societies in this present society view overweight individuals from an unfavourable angle. This could be linked to the belief that obese individuals cannot impact self-control on themselves and have lower intelligence (Debono & Cachia 2007, 547).

The global epidemic of type 2 diabetes mellitus grossly affects indigenous and developing populations. Although genotypic variants related to energy balance may be responsible for the epidemic (Dyck et al. 2010, 249). Type 2 diabetes (T2D) is a metabolic disorder that affect organs in multiples, and its incidence is on the increase at the world level. Presently, over 170 million people and 37 million people in China that are affected by T2D is accounting for 90% of total patients with diabetes. Estimation shows that in 2010, the total number of patients with diabetes will be up by nearly 50%, most especially in the developing countries of Africa, Asia, and South America. Although the pathogenesis of T2D is still obscure but the available medical treatments, together with controlled diet and exercise, have proven to be effective in controlling hyperglycemia and prolong patients' lifespan. (Jin et al. 2009, 1027.)

Gestational diabetes, could be described as a form of glucose intolerance that affects some women during pregnancy. This kind of diabetes is triggered during pregnancy. Most GDM is resolved naturally after delivery, but 5-10 percent of women affected during pregnancy are later found to have diabetes, especially Type 2, after pregnancy. Furthermore, women who have had history of gestational diabetes have a 40-60 percent chance of developing diabetes in the following 10 years. Therefore, changes in lifestyle implemented to normalise blood glucose during pregnancy become essential preventive measures against development of Type 2 diabetes. Pre-diabetes affect 54 million adults and this places them at risk of developing diabetes later in the nearest future. (Renosky et al. 2008, 31.)

There are other groups of types of diabetes caused by specific genetic defects of beta-cell function or insulin secretion, diseases of the pancreas drugs or chemicals (Deshpande 2008, 1255).

Apart from the above-mentioned types of diabetes, there is what is called pre-diabetes. Pre-diabetes is described as a precursor condition to diabetes in which a person is experiencing elevated blood glucose levels but not yet up to diagnostic criteria for diabetes. People with pre-diabetes normally suffer from impaired fasting glucose or impaired glucose tolerance, or both. From 1988 to 1994, approximately 25% of cross-sectional sample of US adults 40 to 74 years of age were classified as having pre-diabetes. For the year 2000, this would mean that 12 million people in the United States had pre-diabetes (Deshpande 2008, 1255.)

2.2 EPIDEMIOLOGY AND COMPLICATIONS

In 2002, diabetes happened to be the sixth leading cause of death,- with 73,249 death certificates referring to diabetes as the underlying cause of death and an additional 224,092 death certificates pointed to diabetes as a contributing cause of death. Diabetes is likely to be underreported as a cause of death simply because diabetes leads to many complications that ultimately cause death. Overall, death risk among people with diabetes is twice as that of people of the same age who do not have diabetes (Deshpande 2008, 1257). Specifically, recent epidemiological data suggests dramatic increase in diabetes prevalence among young adults and pregnant women (Lee et al. 2010, 2033).

Considering the rapid increase in number of adult patients with Type 2 diabetes, and the tremendous and growing public health burden of diabetes, the development and clinical Implementation of effective psychosocial interventions is critical needs (Debono & Cachia 2007, 551). Diabetes and its complications prove to be major cause of morbidity and mortality around the world and contribute largely to health care costs. Diabetes can affect many different organs in the body system and, after a while, can lead to very difficult complications. Complications from diabetes can be categorized as microvascular or macrovascular. Microvascular complications include nervous system damage (neuropathy), renal system damage (nephropatby) and eye damage (retinopathy). Macrovascular complications include cardiovascular disease, stroke, and peripheral vascular disease. Peripheral vascular disease may lead to bruises or injuries that do not heal, gangrene, and, ultimately, amputation. (Deshpande 2008, 1257.) Diabetic peripheral neuropathy is the most common complication in patients with diabetes, accounting for substantial morbidity and mortality and resulting in huge health care costs (Jin et al. 2009, 1031).

In the study of Renosky et al (2008, 32) the results came up with the details about diabetes complications from a related perspective:

- a) Microvascular complication is a misnomer since the complications described are not exclusively microvascular in nature, but the term continues to be used.
- b) Macrovascular complications can result in increased risk for coronary artery disease, peripheral artery disease, and cerebrovascular disease (stroke).
- c) Retinopathy (i.e., damage to the retina from hyperglycemia) causes vision impairment, and with extended damage, eventually vision loss.
- d) Nephropathy is kidney damage caused by hyperglycemia that in some cases results in renal failure or End Stage Renal Disease (ESRD).
- e) Neuropathy refers to damage to peripheral nerve, which typically starts in the nerves to the toes. This damage leads to "phantom" feelings such as pain, burning, tingling, and other unusual sensations, and also deficits such as numbness, inability to sense position of toes and feet, loss of balance, and loss of touch, pain, and temperature sensation in the feet and legs. When an individual loses protective sensation in the lower extremities, injuries such as stubbed toes, blisters from new or poorly fitting shoes, and other traumas to the skin and feet can go unnoticed and untreated, which can develop into foot ulcers. Ocular complications from diabetes, ranging from minimal loss of visual acuity to legal blindness, represent a major public health problem (Saaddine et al. 1999, 1201)

- f) Sexual complications means sexual dysfunction among people with diabetes and can be caused by vascular disease, which impedes engorgement of erectile tissue; neuropathy, which interferes with stimulation.

Diabetes is an essential predictor of premature mortality because it is associated with a substantial increase in mortality from all causes, most especially coronary heart diseases (Barreto et al. 2007, 239). Cardiovascular disease causes up to 65% of all deaths in diabetes patients, Ischemic heart disease and stroke account for the highest proportion of morbidity associated with diabetes (Deshpande 2008, 1257). This rapid increase in numbers will have serious impact in developing countries, rather than in the established market economies, due to both aging of the population and increasing urbanisation. Just under one-fifth of all people with type 2 diabetes are predicted to be living in the Indian sub-continent by 2030 (Chaturvedi 2007, 5).

The prevalence of type 2 diabetes is experiencing a global increase. Type 2 diabetes is a chronic disease, that could be linked with serious complications and co-morbidities. Despite the fact that there is a recent improvements in glucose control in adults with diabetes, <15% of adults with diabetes simultaneously met the goal for three important components of care (i.e. glucose, blood pressure and low-density lipo proteins (LDL) cholesterol) as recently as 2007. (Nam and Chesla 2011, 2.) Early studies have revealed that optimal glycemic control is the ideal primary preventive measure against the development of complications (Ho-tang et al. 2007, 75).

Complications can be either episodic (eg, foot ulcers or infections) that can be treated and re -occur numerous times or progressive (e.g, nephropathy), which usually begin relatively mildly, but over time result in further damage to the organ and greater loss of functionality that is generally irreversible. Other complications include dental disease, reduced resistance to infections such as influenza and pneumonia, macrosomia and other birth complications among pregnant women with diabetes. Although the types of complications are similar for type 1 and type 2 diabetes patients, the frequency or timing of occurrence can vary. (Deshpande 2008, 1257.)

Diabetes can affect physical health in various ways. The most notorious is the development of long-term complications and their consequences. When patients suffer visual impairment, heart problems, end stage renal disease, impotence or peripheral neuropathy resulting in chronic pain, or even worse an amputation, there is likely to be a significant drop in perceived quality of life. (Debono & Cachia 2007, 547.) Much of the burden of diabetes mellitus for both patients and society comes from the vascular complications of the disease. Cardiovascular diseases are the leading cause of death for patients with type 2 diabetes, diabetic retinopathy is estimated to account for 5% of all cases of blindness globally, and up to 50% of patients receiving renal replacement therapy (RRT) have diabetic nephropathy. (Chaturvedi 2007, 4.) Unidentified, untreated, or poorly controlled diabetes can result in disabling and life-threatening long-term complications, including blindness, loss of limbs, heart disease, and kidney failure (Lefebvre & Silink 2006, 1625).

Diabetes self-management training has been considered an important part of clinical management. Over the years, educational techniques have evolved and these have shifted from didactic presentations to interventions involving patient empowerment. (Debono & Cachia 2007, 551.)

Apart from the physical and medical impact of diabetes on the body system, complications of diabetes have an important impact on patient's psychological health. Knowledge of long-term complications may be frightening for patients, even a minor abnormality without serious implications can be upsetting. (Debono & Cachia 2007, 546.)

The rate at which the complication is increasing worldwide is alarming. It is important to bear in mind that currently up to 50% of patients with type 2 diabetes already have some evidence of complications at the time of diagnosis (Chaturvedi 2007, 8.)

Two common types of diabetes most often recognized and treated in the primary care setting are DM1 and DM2. More common is DM2, which is classified as a progressive insulin secretory defect on the background of insulin resistance occurring in 85%–95% of those diagnosed (Hainer 2006, 309). However, the longer lifespan of patients with diabetes has led to the emergence of chronic diabetic complications, such as cardiovascular diseases, kidney failure, and neuropathy, which are the major factors contributing to the morbidity and mortality of patients with diabetes (Jin et al. 2009, 1027).

In the same vein, untreated diabetes can result in both micro-vascular and macro-vascular complications, leading to serious complications including retinopathy, nephropathy, hyper-tension, stroke and cardiovascular (Naemiratch & Manderson 2007, 83.) Identification of diabetes symptoms is another important thing, less commonly, very low blood sugar can lead to cognitive impairment due to neuroglycopenia (lack of glucose in the brain). Parts of the symptoms are confusion, difficulty communicating, and severe irritability. Most people will recognize and treat hypoglycemia before the development of neuroglycopenia, but a small number of individuals are either unable to recognize the symptoms or do not have any. This can lead to complications, including loss of consciousness. (Renosky et al. 2008, 32.)

Treatment varies according to the stage of diabetes, with lifestyle changes to reduce weight and increase physical activity, and medication such as metformin and glitazones to improve insulin sensitivity indicated in the early stages of the condition (Hill 2009, 50). Acute complications of diabetes include diabetic ketoacidosis, hyperosmotic non-ketotic state and hypoglycaemia (Hill 2009, 50). According to Chaturvedi (2007, 8) early intervention with effective treatments to manage glycaemia, hypertension and dyslipidaemia can be expected to inhibit the progression of existing complications and reduce the risk that additional complications will develop. The diabetes control and complications trial (DCCT) has conclusively shown that intensive therapy reduces the risk of diabetes complications in patients with type 1 diabetes. Intensive therapy compared with conventional therapy could reduce the risk of retinopathy, nephropathy and neuropathy by 50–75%. (Tahbaz et al. 2006, 9.)

The main aim of diabetes management is to prevent the development of diabetes complications and reduce financial costs to the patient and the NHS. This includes the identification and treatment of risk factors and the early detection and treatment of complications (Hill 2009, 53). Poor metabolic control of type 1 diabetes increases the risk of serious complications. Guidelines from across the world recognize that every patient with diabetes should have an individualized nutritional plan developed with the help and support of a qualified dietitian. Principles of healthy eating should be followed by all individuals, and specific considerations are recommended for people with diabetes. (Choudhary 2004, 13.)

Most patients with diabetes mellitus (DM) whether type 1 (DM1) or type 2 (DM2) will need to use insulin to control their blood glucose at some point in their lives. For physical activity, campaigns designed to encourage physical activity should emphasize positive health-related feelings associated with exercising, reinforcing that soreness is not necessarily an outcome. (Hainer 2006, 309.)

Results of the research carried out by White et al. (2007, 491) showed that participants who engaged in regular, moderate physical activity over the previous month were less likely than those who had not, to consider that laziness would be a barrier to their performance, suggesting that behavior change programs should aim to engender feelings of motivation to be physically active.

Apparently, the development of new strategies for the prevention and inhibition of diabetes-related complications should be of great significance in improving the life quality of patients with T2D (Jin et al. 2009, 1028). According to the research carried out by Dinneen & Semple (2004, 1) the study randomized 522 middle-aged, overweight patients with impaired glucose tolerance (IGT) to intensive lifestyle modification or usual care. The lifestyle intervention involved both dietary change and increased physical activity. It was associated with a 58% reduction in the risk of progression to diabetes over an average of 3.2 years' follow-up.

Dinneen & Semple (2004, 1) also presented data on the degree of adherence to five components of lifestyle intervention:

- a) Weight reduction of $\geq 5\%$
- b) Reduction of dietary fat to $\leq 30\%$ of calorie intake
- c) Reduction of saturated fat to $\leq 10\%$ of calorie intake
- d) Increased intake of dietary fibre
- e) Moderate-intensity exercise for ≥ 30 minutes per day.

Besides complications of diabetes on the organs of the body, diabetes' impact has also been felt in social aspect of life as regards patient, families and government expenditure. The mere presence of diabetes can affect the quantity and quality of a patient's relationships. As patients begin to institute changes in daily habits in order to manage diabetes most effectively, loved ones may begin to rebel. An important issue is the psychological effects of sexual dysfunction. Erectile dysfunction is negatively associated with an array of dimensions of psychological well being. (Debono & Cachia 2007, 546.) Diabetes mellitus is the most common cause of blindness among working-age adults, the most common cause of non-traumatic amputations and end-stage renal disease, and the sixth most common cause of death in the United States (Centers for Disease Control and Prevention 2004, 951).

2.3 CAUSES AND RISK FACTORS

The reduction in the prevalence of complications over the past 40 years is undoubtedly due to greater appreciation of risk factors for those complications and consequent improvements in patient management (Chaturvedi 2007, 4). The sudden development of short-term complications, such as ketoacidosis and severe hypoglycaemia that can lead to coma and, if untreated, death, are a daily threat to the many people worldwide with diabetes who have major difficulty in accessing essential treatment supplies (including insulin) (Lefebvre & Silink 2006, 1625.)

There are numerous situations that could cause diabetes or serve as risk factors. The risk of cardiovascular disease (CVD) is increased in patients with type 2 diabetes. These patients are two to three times more likely to develop coronary heart disease (CHD) and at least twice as likely to die as a result of CHD as individuals with normal glucose tolerance (Adiseshiah 2005, 24). Its increased prevalence is associated with patterns of development, changes in employment, residence, use of time, diet and nutrition, and increased sedentary lifestyle (Naemiratch & Manderson 2007, 84).

Prominent risk factors are obesity, family history of diabetes, previous GDM, and race/ethnicity. In the next 50 years, diagnosed diabetes is predicted to increase by 165% in the United States, with the largest relative increases seen among African Americans, American Indians, Alaska Natives, Asian and Pacific Islanders, and Hispanic/Latino persons. (Centers for Disease Control and Prevention 2004, 951.)

International management guidelines for the prevention of CVD now recognize type 2 diabetes as an important independent risk factor, defining it as a 'coronary equivalent' (Adiseshiah 2005, 24). Carbohydrates are recognized to cause a postprandial rise in blood glucose, many factors contribute to the extent of the rise. These factors include the amount of carbohydrate consumed, the composition of this carbohydrate (constituent proportions of glucose, fructose, lactose, amylose, amylopectin, or starch), the effects of cooking or processing on food structure, and other components of the meal (such as fats that may slow digestion). Hyperlipidemia is one of the risk factors for the development of cardiovascular diseases. (Jin et al. 2009, 1029.)

More so, worldwide, loss of traditional lifestyles—ie, low-energy diets high in vegetables and pulses and low in animal fats, added sugar, and salt, together with the need for regular physical activity for parts of daily life such as work, transportation, and feeding is weaving a web of risk factors into the lives of already vulnerable people. Left unchecked, the burgeoning epidemic of diabetes in developing countries will exact a terrible toll from people and economies. (Lefebvre & Silink 2006, 1625.) The increased incidence of CVD in type 2 diabetes is attributed to a cluster of metabolic disturbances that are largely a result of insulin resistance and are compounded by hyperglycemia and hypertension. Evidence suggests that dyslipidemia is a major modifiable CVD risk factor in patients with type 2 diabetes that should be a target of primary risk reduction. (Adiseshiah 2005, 24.)

In the study of an audit of diabetes control, dietary management and quality of life in adults with type 1 diabetes mellitus, and a comparison with non-diabetic subjects. Only a few know they have complications of diabetes. Most find compliance with a dietary programme based on monitoring carbohydrate intake reasonably straightforward. Their total fat intake is not much different from non-diabetic peers. (Tahbaz et al. 2006, 4.) For physical activity, behavioral and control beliefs distinguished high- from low-activity participants whereas behavioral and normative beliefs differentiated those engaging in greater rather than less low-fat food consumption (White et al. 2007, 491).

2.4 DIABETES AS A SOCIAL BURDEN

Today, about 6.3% of the U.S. population— more than 18 million Americans— has diabetes (Centers for Disease Control and Prevention 2004, 951). Meanwhile, cost of diabetes accounted for about 3–6% of total healthcare expenditure in eight European countries and hospital in-patients costs are the largest single contributor to direct healthcare costs (Park 2004, 33).

Thus, early detection and prevention is important to reduce the cost of diabetes and related complications (Park 2004, 33). The disease profile of our world has changed. In low-income and middle-income countries, chronic non-communicable health disorders, such as diabetes, are compounding the burden of infectious diseases. Once thought of as a disorder of fairly affluent people, type 2 diabetes is set to join malaria as a disease of poverty and a cause of poverty. Diabetes is now a global problem, equal in size to that of HIV/AIDS. (Lefebvre & Silink 2006, 1625.) The Diabetes Attitudes, Wishes and Needs (DAWN) programme, the largest global psychosocial study related to diabetes care, reported that the majority of patients with Type 1 or Type 2 diabetes experience psychological problems (67.9% and 65.6%, respectively) (Debono & Cachia 2007, 546).

However, the full dimensions of the diabetes crisis remain unrecognized. However, diabetes is grossly under-reported on death certificates because people usually die from its complications (Lefebvre & Silink 2006 2006, 1625.) Patients with diabetes face major changes in lifestyle and the possibility of developing debilitating and life-threatening complications. Patients with poorer glycaemic control, have a higher prevalence of concomitant psychiatric illnesses, such as depression and eating disorders (Debono & Cachia 2007, 546).

3 PURPOSE AND AIM

The main purpose of this thesis is to produce information about prevention of diabetes complications.

The aim is to produce a guide for the public use in Terveystietä pages.

4 DATA ANALYSIS AND REVIEW PROCESS

The method used in analyzing the data is Systematic literature review. Systematic literature review uses existing primary research for secondary data analysis, eliciting common themes and results, and providing a good evidence based to inform policy making and practice (Neale 2009, 51). Analysis and review of the articles were guided by certain criteria, drawn before the search for the relevant resources. Criteria were set in other to avoid being deviated away from the purpose and aim of the study, which was categorized as Inclusion and exclusion.

According to Brophy et al. (2008, 11) randomized controlled trials related to a particular question are indentified systematically and methods are used to identify studies are reported in full. In the inclusion criteria, the target was to search for the relevant articles that base their study around prevention of diabetes mellitus among adults; few of them must discuss epidemiology of diabetes; details about prevention of diabetes; causes and risk factors of diabetes mellitus; coping and self management; it must be adults specific; must fall between the year 2000 onward; the research must be carried out by the experts; the selected articles must cut across a number of countries, including Finland and must have been published in any of the academic journals.

The exclusion criteria are drawn to do away with the irrelevant articles. Articles based solely on children are to be removed but if compared with the adults, it can be given consideration; any article published below the year 2000 should not be considered just to get recent facts and figures; articles that are not health education directed should be given less priority because the main focus of the study is to educate the people.

Managing the volume of the evolved articles was a challenge but systematic review method helps the situation. A systematic review is a review of the evidence on a clearly formulated question (Callaghan & Waldock 2006, 344). In the review process, all these criteria were met except that out of the explored two books, one of them was published in 1999 (Diabetes Cognition and Social Support in the Management of Diabetes. A cross sectional study on social psychological determinants of health-related quality of life and self-care among adults with type by Anna-Mari Aalto). This is below the set year but the reason for including the book is that, the book is written by a Finnish author and I think it will give me more insight into the Diabetes mellitus situation in the Finnish society.

Academic databases such as Ebsco, Sciencedirect, OVID and CINAHL were used to make the study more reliable and valid and search terms such as Diabetes mellitus, diabetes complications, preventions, coping and self management, health and self education, causes and risk factors. Large numbers of articles evolved and many articles appear to be important and relevant but set criteria were strictly followed to reduce the load and extract the ones with needed features.

5 CREATING WEBPAGE

As it is widely known that the most common medium of accessing information nowadays is through webpages, not only because of its accessibility at any location but also because of its easy and convenient way attached to its accessibility. Due to this reason, creating a webpage for this study becomes important in order to reach out to the target population who may not find it comfortable to access the main thesis in the library. The world wide web has become such a successful channel in delivering and sharing information that people are getting used to searching the web as the first resort for information. However, users are often not able to retrieve exact information of interest. The amount of data accessible via the web is huge and growing rapidly. (Liu et. al 2004, 197.)

In creating this webpage, content of the webpage is well structured and the hierarchy of information is perfectly clear for clarity purpose, background colour does not interrupt with the text and the text is big enough to read. It is written in simple and clear language as some of the members of the target population may not be well educated or have no education in the health field. According to Zhang & Dimitroff (2005, 666) there are various factors which can contribute to visibility of a webpage in a search engine result list, for example, webpage metadata structure, webpage content, hyperlink cited status, search query expansion, and other possible factors. Efforts were made to ensure that all the directives are proven, tested and trusted directives from the academic database.

While designing the webpage, comfortability of the users is made a priority at the back of the mind. Obviously, a webpage designer cannot control an internet searcher's behavior and cannot change webpage hyperlink status (Zhang & Dimitroff 2005, 667). Navigation buttons and bars were made easy to understand and use. These buttons and bars appear by the left side of every page and it is consistent throughout web pages. Real life picture is not posted on the webpage to avoid violating the law of privacy.

6 HEALTH EDUCATION

This section is meant to produce information about the health education. Being diagnosed with diabetes demands early treatment and education. Education should initially impart key information and help the patient and family grieve, so they can then take on new challenges. One should initially teach patients the skills on metabolic control. In-depth education is most useful once the patient is familiar with the necessary survival skills and has made an emotional adjustment. (Debono & Cachia 2007, 551.) Diabetes education has been an essential component of diabetes management since the 1930s and is increasingly recognised as an integral part of chronic disease management. The objectives of educating people with type 2 diabetes are to optimize metabolic control; prevent acute and chronic complications; improve quality of life by influencing patient behavior and produce changes in knowledge, attitude and behaviour necessary to maintain or improve health. (Atak et al. 2008, 67.)

How to educate people requires setting out goals. The goal of promoting the patient's well-being and improved quality of life while preventing complications requires a treatment approach that incorporates an understanding of the social, psychological and psychiatric ramifications of diabetes. (Debono & Cachia 2007, 551.) In addition, diabetes and its complications can have adverse psychosocial and vocational implications. For all these reasons many people with diabetes could benefit from rehabilitation counseling services. For clients with diabetes complications, counseling should help address psychosocial and vocational concerns related to impairments and limitations they experience. This may include discussing how the complications are affecting a person's relationship with a romantic partner or how the complications are affecting the person's ability to carry out his or her work responsibilities. (Renosky et al. 2008, 33.)

Impacting knowledge on the risk factors and how to avoid them, meanwhile there are risk factors that are not within the control of the patient. Risk factors for type 1 diabetes include family history, race (with whites at higher risk than other racial or ethnic groups), and certain viral infections during childhood. Risk factors for type 2 diabetes are more diverse; some are modifiable, and others are not. Non modifiable risk factors for type 2 diabetes include age, race or ethnicity, family history (genetic predisposition), history of gestational diabetes, and low birth weight. It has been suggested that improvements in glycemia control, blood pressure, and cholesterol level can reduce a person's risk for complications. Better control of these risk factors in people with diabetes can lead to more favorable outcomes. (Deshpande et al. 2008, 1261.)

Rehabilitation counselors should also be aware of the counseling implications and strategies for individuals who have vision impairment, renal failure, amputation, coronary heart disease, congestive heart failure and stroke. In addition, it is important to recognize that complications may result in impairments and limitations that may hinder clients from maintaining self-care behaviors, which can lead to further physical and emotional complications. (Renosky et al. 2008, 33.)

6.1 PREVENTION OF DIABETES MELLITUS COMPLICATIONS

For people who have not experienced complications, the possibility of developing them is a relevant point of discussion in counseling. Clients should be educated about potential complications and helped to develop realistic ways of coping with this possibility. Many people mistakenly fear that complications are inevitable; therefore, counselors should emphasize that while glucose control is fundamental, prevention does not require blood sugars to be "perfect." It should also be noted that some people appear to be genetically protected from complications regardless of their success in controlling their diabetes. (Renosky et al. 2008, 33.)

For instance, only 40% of people with diabetes are prone to nephropathy, and diabetic complications affect individuals of different ethnic and racial groups unequally. There is currently no way to predict who is prone to complications, but if people do not have a complication after 15 to 20 years of having diabetes they are unlikely to develop it. (Renosky et al. 2008, 33.) Ways of preventing complications are low protein intake and carbohydrate intake. European guidelines advise protein intake at the low end of the range (about 0.8 g/kg body weight) for diabetic patients with evidence of nephropathy, with a minimum daily intake of 0.6 g/kg body weight because of risk for malnutrition at lower levels (Choudhary 2004, 11).

Central to preventing these complications is not only good glucose control, which depends on day-to-day and even hour-to-hour self-care, but also behaviors such as frequent glucose self-monitoring, regular exercise, and eating healthfully. This self-care regimen does not come easily to most people. (Renosky et al. 2008, 31.)

Family-based behavioural procedures such as goal-setting, self-monitoring, positive reinforcement, behavioural contracts, supportive parental communications, and appropriately shared responsibility for diabetes management have improved regimen adherence and glycaemic control (Debono & Cachia 2007, 551). In addition to self-monitoring, average blood glucose level is monitored by the health care team with a glycosylated hemoglobin test (HbA_{1c}; reported as a percentage), which indicates the average glucose level over the previous three months (Renosky et al. 2008, 32).

6.2 SELF MANAGEMENT AND COPING STRATEGIES

Home management of diabetes seems the most important part of diabetes management, diabetes patients without serious complications spend more time at home rather than hospital. This calls for essential diabetes education that can be useful at home. Diabetes educators implementing self-management programs must assess levels of health literacy for their target population. This assessment will enable them to develop strategies for communicating more effectively with patients. (Tang et al. 2007, 75). However, goals are usually considered more specific and change more frequently than values, which also applies to those related to self-regulation behavior concerning exercise and diet (Ofstedal, Karlsen & Bru, 2010, 2549). Guthrie and Guthrie (2009, 87) noted that diabetes is the only disease in which an individual or other family member is taught how to regulate a medication, sometimes on a dose to dose basis. Education and supportive guidance is necessary and recognition of a person's capability to do this is an important consideration. Below are the home management measures.

- a) For patients who are on insulin, insulin should be made available by the health care officers. Insulin administration may include a pen choice devices with various length needles, sizes of the needles or syringe are pre-determined by the healthcare officers. Other supplies expected with insulin are alcohol swap, continuous glucose monitoring machine and strips. How to use glucose monitor and appropriate strips must be known by the patients or people around him or her and strips must be kept fresh and clean.
- b) Taking of medication at the right time, most of the time it is advisable to decrease or avoid the previous medications. During sudden health crises, higher doses may be needed immediately but the maximum one can use must have been instructed by the healthcare officer.

Alarm clock can be used to remind the client of the time to take the medication or people living with him or her can remind him.

- c) Regular measuring of blood pressure is advisable. Blood pressure machine can be purchased or one can be visiting the health centers and the reading are taken down on a regular basis. Normal blood pressure is 120/80 mmHg or slightly lower.
- d) In case of continuous sleep apnea, inability to sleep properly at night, one is encouraged to report to the healthcare officers because lack of sleep at night can trigger hypoglycemic episodes
- e) Blood and urine should be monitored at all time. A meter for this may be purchased or acquired from the hospitals. Ketone test strips for testing are available in a bottle or in individually foil-wrapped units. Results of these tests help in controlling the amount of insulin needed or the amount needed to be administered.
- f) Sudden illness at home may occur, ordinarily, if glucose level is controlled illness should be minimal. Vomiting and diarrhea are normally accompanied lowered blood glucose level. Fluid increase is the first line of action but if it is nausea and vomiting, teaspoon of small amount of sugar containing fluid should be taken. If the nausea is off, then soft food, cracker and soups can be taken.

g) Food, hygiene and adequate exercises play an important role in managing diabetes, According to the research carried out by Dinneen & Semple (2004, 1) five components of lifestyle intervention good to be observed

- Weight reduction of $\geq 5\%$
- Reduction of dietary fat to $\leq 30\%$ of calorie intake
- Reduction of saturated fat to $\leq 10\%$ of calorie intake
- Increased intake of dietary fibre
- Moderate-intensity exercise for ≥ 30 minutes per day.

h) In case of hypoglycemic crises or low sugar, having a glucagon kits at home, school or work place is a must. Other treatments for hypoglycemic must also be available whether in a tablet, gel or juice form.

i) Hyperglycemia is the opposite of hypoglycemia. This is when the fasting blood glucose is persistently increasing even when on adequate doses of insulin. Guthrie and Guthrie (2009, 90) define hyperglycemia as a result from improper insulin administration or it might be due to therapeutic or pharmacokinetic action.

Comparism of Hyperglycemia and Hypoglycemia

Table 1

SIGNS AND SYMPTOMS	
Similarities	
Hyperglycemia	Hypoglycemia
Irritability	Irritability
Headache	Headache
Hunger (polyphagia)	Hunger
Nausea	Nausea
Vomiting	Vomiting
Coma	Coma
Convulsion (Blood sugar > 1.800 mg/dl)	Convulsion
Differences	
Polyuria	Nervous
Polydipsia	Trembling
Double vision	Blurred Vision
Abdominal pain	Sweaty
Soft pupils	Dilated or constricted pupil
Chest pain	Change in personality
Blood pressure down	Blood pressure up
Dry skin	Cold, clammy skin

(Guthrie & Guthrie 2009, 90)

Diabetes or its complication could be a life time disease, therefore, coping with it is a very important thing for the patients and the families to accept (Karlsen & Bru 2002, 246). Coping may be characterized by cognitive or behavioural attempts either to avoid a stressful situation or to actively do something to alter the situation. Although many people with diabetes seem to succeed in integrating the demands of the disease into their daily lives, diabetes may involve a lot of stress for the individual. (Karlsen & Bru 2002, 246.)

As patients may be passing through moments of despair and hopelessness we must be there to educate, help and provide a sense of support. To provide such a sense of security is the fundamental basis of successful medical care. (Debono & Cachia 2007, 553.) Psychological well-being is itself an important goal of medical care, and psychosocial factors are relevant to nearly all aspects of diabetes management. Being diagnosed with diabetes imposes a life-long psychological burden on the person and his/her family. People with diabetes may use a variety of styles in order to cope with the stressing demands of the disease. In the present study, coping styles refer to habitual coping when dealing with diabetes-related strains, and will therefore be understood as diabetes-related coping styles. It should, however, be noted that diabetes related coping styles are not understood as stable personality traits. (Karlsen & Bru 2002, 246.)

To cope with diabetes, one needs to accept his present situation, may be as an amputee, a blind, a regular routine observer or somebody that cannot eat as he wishes like the others. The regimen of a diabetes patients involves numerous daily behavioural tasks, as well as changes in such basic habits as diet and exercise, all of which must be done for the rest of the patient's life. Clinic should be seen as his second home at the back of his mind and should let friends understand he is not like them in all areas. Laziness and ignorance should never be a habit. (Karlsen & Bru 2002, 245.)

As much as the efforts are made to help the diabetes patient, an attitude on the side of the patient is affecting the care plan. Lack of adherence has been demonstrated by the Diabetes, Audit and Research in Tayside, Scotland (DARTS) initiative, which examined the rates of compliance with anti-diabetic therapy and its influencing factors. Data from 2849 patients with type 2 diabetes indicated that only 31–34% of patients were compliant with oral hypoglycemic mono therapy, while only 13% were concordant with combination therapy. Notably, factors that significantly affected compliance included combination therapy, multiple daily dosing, increasing numbers of concomitant medications, age and duration of diabetes. These results clearly show that patients with type 2 diabetes find it increasingly difficult to adhere to their daily. (Adiseshiah 2005, 25.) Intervention strategies that enable patients to make decisions about goals, therapeutic options and self-care behaviours and to assume responsibility for daily diabetes care are effective in helping patients care for themselves (Debono & Cachia 2007, 551).

For many patients, the demands of self-care can be burdensome, frustrating and overwhelming, affecting the physical, psychological and social aspects of everyday life (Debono & Cachia 2007, 546). Concluded that identifying and understanding barriers to ensure adherence to diabetes standards of care in the patients self-management and the clinician interventions are the first steps in improving diabetes care and success in diabetes management (Nam et al. 2011, 2).

Nam et al. (2011, 2) in his study, however noted the barriers that are responsible for the failure of diabetes management on the part of patient and on the part of the health care provider.

On the part of patient :

Adherence: Glycemic control is affected by poor patient adherence to treatment regimens, for example, failure to keep appointments or take medications as recommended. Once daily regimen has higher rates of adherence than twice-daily regimens. Better adherence to a self-care regimen, a characteristic of active patient self-management, can reduce mortality and disability, improve quality of life and reduce health care costs.

Attitudes and beliefs: People with diabetes hold a wide range of attitudes and beliefs about diabetes and its treatment which in turn affects the way they perceive the need for and importance of self-management education. Anderson et al. surveyed 1202 persons with type 2 diabetes, using a revised version of the Diabetes Attitude Scale.

The natural progression of type 2 diabetes suggests that 60% of individuals with the disease will eventually require insulin treatment to optimally control blood glucose levels. Despite the demonstrated efficacy of insulin therapy in achieving and maintaining glycemic control in individuals with type 2 diabetes, many individuals that may benefit from insulin therapy do not receive it, or do not receive it in a timely manner.

Knowledge: The relationship between knowledge and health outcomes is inconsistent. Knowledge does not necessarily lead to risk-reducing behavior. People may engage in unhealthy behavior despite knowledge of their risks.

Culture/Ethnicity/Language: Culture influences an individual's beliefs, attitudes, knowledge, and behaviors, and in turn, can affect diabetes self-management.

Financial resources: Cost of treatment may be a significant barrier to diabetes treatment particularly for patients with a low socioeconomic status and limited to no health insurance coverage.

In a diabetes screening program in New Mexico, low annual income and lack of health insurance were identified as primary reasons why patients ($n = 118$) with newly diagnosed type 2 diabetes did not seek and obtain medical care. Sixty percent of uninsured patients failed to obtain care following diagnosis compared with 6% of those who were insured.

On the part of the health care provider :

Beliefs, attitude and knowledge: Physicians' attitudes towards diabetes management may be more important than their actual knowledge of the disease. Clinicians' beliefs, attitude and knowledge influence patients' adherence to the prescribed regimen.

Interaction and communication: Patients' disease perceptions are influenced by the types of services they receive and the types of health care professionals they encounter as part of their diabetes care. Good patient-health care providers' communication predicts better diabetes self-care, better diabetes outcome or both.

Health care system: In the current health care system, over stretched primary care providers need to complete many preventive activities, deal with chief complaints, write prescriptions and referrals, and handle other issues within a 10- to 15-min office visit.

7 DISCUSSION

In the review of the articles, main ideas needed to take care of the purpose and aims of the study were noted and drawn out in the health education section while some other conflicting ideas from different authors also evolved. Efforts were made to choose the salient points in order to arrive at a reasonable point for the benefit of the study.

Education appears to be an effective tool to combat growing situation of diabetes epidemiology in many reviewed articles but Lefebvre & Silik (2006, 1626) sees education alone as not being enough, well-structured and appropriate diabetes education is inadequate, both for people with the disease and healthcare providers. Most countries do not have a national diabetes programme. Without countrywide preventive measures, the deadly combination of communicable and non-communicable diseases will disable and kill millions of people, and will further stifle economic development in the regions where growth is needed most. The difficulties highlighted in the 2006 World Diabetes Day campaign need efforts beyond the health-care sector: the food and drink industry, nutritionists, educators, and the community at large must play a key part. From the perspective of another author, patient education had a limited effect on knowledge and self reported self management behaviours but a significant effect on self efficacy in patients with type 2 diabetes (Atak et al. 2008, 66).

As many authors concluded that coping strategies help the life of a diabetes patient. Karlsen & Bru (2002, 246) claims that there is no clear consensus as to which coping styles or modes of coping are most effective, that is, how well a coping strategy serves the purpose of resolving problems, preventing future difficulties or relieving emotional distress.

However, previous research suggests that chronically ill patients are particularly inclined to use emotion-oriented strategies to reduce high levels of stress imposed by their disease, although many employ a wide range of strategies when they appraise their situation as stressful. Nutritional guideline has proven to be a reliable solution in some countries but conflicts arose between the Nutritional guidelines from different regions. The European, Canadian, and British nutritional guidelines for diabetes encourage the use of foods with low glycemic indices (for example, legumes, oats, pasta, and fresh fruits), while the American guidelines suggest there is not enough evidence of long-term benefit for this to be a primary strategy. (Choudhary 2004, 11.)

Many educators and healthcare officers have forbidden consumption of sugar and fats for the diabetes patient and solely depend on insulin to regulate the glucose level. Fats are no longer labelled “bad” and carbohydrates considered “good”, but both of these macronutrients are now recognized as having “good” and “bad” types. Considering the contribution of Renosky et al. (2008, 32) glucose control partially depends on pharmacological management, self-care behaviors are equally essential, regardless of the type of diabetes. Self-management of blood glucose requires constant balancing of food intake, appropriate use of medications, and physical activity. Meanwhile, since carbohydrates typically form the major portion of most meals, carbohydrates with a low glycemic index may be more suitable for people with diabetes. Sugar is no longer forbidden, but is counted as part of the total carbohydrate intake. The total quantity of food consumed is as much responsible for the obesity epidemic as the type of food. Exercise is increasingly recognized as a vital complement to medical nutrition therapy, regardless of whether patients are managed by insulin, oral antidiabetic medications, or diet alone. (Choudhary 2004, 10.)

Number of death due to diabetes complications is stressed to be increasing at alarming rate despite the intervention of the health service and many reasons were raised to support this point but according to Chaturvedi (2007, 6), this is seen from another angle, among the total population, there has been a clear trend towards lower mortality rates from CVD over the past 30 years, largely attributable to improved health status, including lower smoking rates, and better management of hypertension and dyslipidaemia. Adiseshiah (2005, 24) supported this fact that these predictions are likely to be a conservative estimate. However said that, these do not account for a population that is ageing and becoming increasingly sedentary, urbanized and obese, meanwhile, by current estimates, even in developed countries, 50% of individuals affected by type 2 diabetes are currently undiagnosed.

Additionally, the medical and behavioral management of both types of diabetes can vary widely from person to person. While there are general management principles, different individuals may be advised to adopt different behaviors, making it essential that professionals provide the same standard of care when serving clients with diabetes. (Renosky et al. 2008, 32).

Control of hypoglycemia and hyperglycemia is described as one of the ultimate approaches to prevent diabetes complications. Jin et al. (2009, 1031) worked on T2D and raised an alarm that patients with T2D, even with effective control of hyperglycemia, usually develop diabetic complications, such as cardiovascular, microvascular, nephropathy, and neuropathic diseases, which increase the morbidity and premature mortality of T2D. He further stressed that treatment with regular medicines and diet and exercise programs effectively controlled hyperglycemia and hypertension. However, these therapeutic strategies failed to prevent the development of diabetic complications.

8 ETHICAL CONSIDERATION

Ethical consideration plays a vital role in research work and can be viewed from various angle. The researcher can use the ethics committee as a guide and support throughout the process (Robley 1995, 48). In the research work, breaking the ethical rules are strictly avoided. All the articles used for the study are not under copyright violation. They were retrieved from the academic databases with official access to and with supervisors carried along in the process. As parahoo (1991, 36) states, the means and consequences of research are very much guided by a research ethic.

Quotes are not copied directly and all the used quotes are referenced in the reference page. Efforts were made not to mislead people with unclear or uncertain information as the work and its guide are meant to educate people about their health. As parahoo (1991, 36) states, the means and consequences of research are very much guided by a research ethic. Raised points were critically compared before making a conclusion. At this level of research work, it is understood that recommendation is not allowed, therefore, suggestion was only made in the end.

The proliferation of computing and networking techniques has made it possible for users across the world to access internet sources and electronically publish the information on the internet. The world of the internet was transformed with the development in the mid-1990s of search engines. (Zhang & Dimitroff 2004, 665.) In the development of the webpage, meant to be published on the web for people's guide. Efforts were made to consider religious and social beliefs of the audience and made sure there are no obscene pictures or comments that could violate the law of internet.

9 RELIABILITY AND LIMITATIONS

This study is based on reviewing the pre-existing works on Diabetes, its complications and coping strategies. Meanwhile, the study has a specific target population and the guide is expected to be an educational tool to educate people on how to prevent diabetes complications among adults. Considering the importance of the thesis, efforts were made to make it as perfect and reliable as possible by using the already recognized academic databases. A number of articles and books were properly utilized and the important points were extracted. Though, there are conflicts of ideas but efforts were made to strike the balance in between the ideas of the authors.

Meanwhile, the topic was certified by my supervisors before proceeding and continuous check are done on it until the final stage to make sure it is close to perfection. All the articles used are not below the year 2000, though some articles based their conclusions on the old reports compiled before the year 2000 but those articles that compared this reports with the current situation were selected. Nevertheless, only one of the books used was written before the year 2000. The reason for involving the book is the fact that it was written by a Finnish and gave the insight into the diabetes situation in the Finnish society.

There is hardly a research work without limitations, some limitations came up in the process of the review. A number of articles that could be so important pop up in the search but they are in Finnish language. This could have given me more opportunities to draw a very conclusive message around Finnish society as regards diabetes complications. Another limitation is the lack of time to really detail the work, the time given to carry out the study is meant for a sizeable thesis, therefore, there was less time to explore more than this. What I also consider to be a limitation is my inability to meet the concerned patients themselves in real life and ask some cogent questions. I believe making a guide for the people that are not carried along in the study jeopardizes the effectiveness of the guide.

10 CONCLUSION

Considering the views and perspectives of various authors from different countries, Preventing Diabetes mellitus complications among adults has been proving to be a difficult task and series of researches have been based on it, yet, impact has not really been felt. Although there is considerable evidence of a trend towards a lower prevalence of diabetic complications due to better patient management over the years, a number of caveats do need to be applied when comparing data from observational studies. (Chaturvedi 2007, 5.)

It was observed that, treatment of complications rarely helps because most of the patients eventually died or remain incapable for the rest of their life. Improvements in the management of patients with diabetes over the past three decades have helped to delay the development of vascular complications, also, interventions are at their most effective if they are tailored to individuals' needs, are multidisciplinary, and include regular follow-up with encouragement. (Adiseshiah 2005, 26.) Furthermore, the provided webpage information is going to be helpful to both diabetes and non-diabetes people. Having the knowledge of what to do to prevent chronic complications of diabetes is more advised by the healthcare officers. The guide is simplified for easy understanding of the users who have no previous knowledge in health field.

Prevention of Diabetes mellitus complications among adults is a very broad area and they come with different natures, therefore, preventing them should be more detail than this. Due to this reason, this study should be considered as a step or contribution to ways of preventing diabetes mellitus.

In the process of the review, some other ideas came up which could as well serve as a thesis topic for the future students. Such topics are:

1. How can diabetes patients cope with daily routine of diabetes mellitus management?
2. End of life care for patients with diabetes mellitus complications.

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